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ABSTRACT

The Charleston Higher Education Consortium (CHEC), which includes all postsecondary institutions in the tri-county area of Charleston, suggested that a need existed for improving the local capacity of educational providers (particularly colleges and universities) and industries by conducting reliable assessments of the continuing education needs of industrial scientists and engineers and by designing appropriate follow-through responses. Therefore, a multi-college, multi-industry system was devised, tested and disseminated that offered a model of comprehensive needs assessment and coordinated follow-through procedures. In addition to the rationale for the project, the first part of this report includes a summary of the project's activities for 1978-1980. The second part of the report includes documents related to the project including (1) initial management survey; (2) follow-up management interview; (3) employee survey; (4) recommendations report; and (5) outcomes survey. (Author/SK)

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A Model Continuing Education Needs Assessment/Response System in Science and Engineering*

SUMMARY REPORT

June, 1981

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INTRODUCTION

In the Spring of 1978 the Charleston Higher Education Consortium applied for a grant under the Continuing Education for Scientists and Engineers (CESE) program of the National Science Foundation's Division of Science Education Development and Research (SEDR) to fund the Consortium's development of a model system of local needs assessment and follow-through responses in the area of continuing education for industrial scientists and engineers. The Consortium proposed that it test this system in its own region, the tricounty Charleston SMSA[1], a 2600-square mile area containing a number of small-to medium-sized industries that employ engineers and scientists (principally chemists). A primary motive for the Consortium's interest in undertaking this project was to answer the local need for the Consortium's own member colleges and tricounty industries and businesses to work more closely and more systematically together and, more particularly and immediately, to conduct needs assessments in the areas of engineering and chemistry; the local interest in the project was evident by the Trident Work-Education Council's awarding a supplemental grant for the Consortium's follow-up work on the project. Finally, when it awarded the Consortium the SEDR grant, the National Science Foundation asked the Consortium to coordinate its project with five other NSF-funded projects that were to examine the continuing education needs of scientists and engineers employed in small, geographically dispersed industries.

Given these multiple purposes, the Consortium's project obviously has several potential audiences. This Summary Report, then, has been organized in such a way as to make the data and recommendations readily accessible to each of these groups. Thus:

--The tricounty audience and those interested primarily in the local applicability of the project will be most interested in Part II of the report, which contains the data summaries of all of the project surveys and the recommendations for further local actions.

--Those readers who are interested in conducting needs assessment/follow-through projects in their own locales will want to study the report in its entirety, but should find the recommendations in Part III particularly useful as a means of learning from the Consortium's experience how they might best adapt this project's instruments and procedures to suit their own purposes.

---Those readers who wish to compare the tricounty data with those collected by the other NSF surveys[2] or similar projects will find most useful the summaries

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[1] Standard Metropolitan Statistical Area (SMSA)

[2] These surveys included one project that was national in scope, a "Survey of Continuing Education Delivery Systems for Scientists and Engineers Employed in Small, Non-Urban Establishments", that was conducted by the Battelle Laboratories of Columbus, Ohio. This project's summary report is being distributed by the Continuing Professional Development Division of the American Society of Engineering Education and is available for $15.00 (payable to: ASEE/CPD Division) from Dr. J.M. Biedenbach, Director, Continuing Engineering Education, College of Engineering, University of South Carolina, Columbia, South Carolina 29208.

of the Management and Employee Surveys in Part II of the report. (This audience will find that the Consortium has, in many instances, collected identical data to the other NSF projects. But these readers should also be aware of the significant differences between the Consortium's and these other surveys: whereas the other projects surveyed industries in non-SMSA counties, the tricounty region is coextensive with the Charleston SMSA; and whereas the other projects did not survey plants that employed more than 500 persons, 9 of the 25 plants the Consortium surveyed had more than 500 employees.)

If any reader has questions or needs further information about the project, he or she should feel free to contact either Dr. Monica Hamill of the project staff or Dr. John Zemp, the project director.

I: DESCRIPTION OF THE PROJECT

A. THE CHARLESTON HIGHER EDUCATION CONSORTIUM

The member organizations of the Charleston Higher Education Consortium (CHEC) include all of the postsecondary institutions in the tricounty region: the Baptist College at Charleston, The Citadel, The College of Charleston, the Medical University of South Carolina, Trident Technical College, and the Marine Resources Division of the South Carolina Wildlife and Marine Resources Department. (The Marine Resources Division is not an educational institution, but does contribute faculty and research resources to various CHEC programs.) The CHEC institutions offer a number of programs in science and engineering, including associate degree programs in architectural, chemical, civil, electrical, electronics, mechanical, and nuclear engineering technology (Trident Technical College); baccalaureate degree programs in chemistry (Baptist College, College of Charleston, Citadel) and baccalaureate degree programs in civil and electrical engineering (Citadel). In conducting these programs and related continuing education courses, the institutions have publicized their availability to industry employees; in some instances, the site and scheduling of courses have been arranged in response to industry needs. In addition, the College of Charleston and the Medical University have cooperated in offering occasional graduate-level courses in response to the needs of industrial chemists. One of the Consortium's continuing objectives has been to formalize and strengthen the member institutions' working relationships with the industrial and military communities in order to improve their ability to assess and respond to those communities' educational needs more quickly and effectively. This project launched a series of activities designed to realize that objective.

B. RATIONALE FOR THE PROJECT

1. National Need

The Consortium planned its NSF project as a means of answering the need for improving the local capacity of educational providers (particularly colleges and univiersities) and industries to conduct reliable assessments of the continuing education needs of industrial scientists and engineers and to design appropriate follow-through responses. The project proposed to answer this need by devising, testing, and disseminating a multi-college, multi-industry system that would offer a model of comprehensive needs assessment and coordinated follow-through procedures.

In order to document these needs and to find out if such a model system had already been devised and publicized, the Consortium requested that an ERIC literature search be performed by the S.C. Department of Education's Education Products Center. The majority of the books, monorgraphs, and articles that the search yielded described innovative programs and delivery systems. None of the authors offered a model of local needs assessments. Several however, emphasized the important role that local needs assessments play in the utilization of continuing education programs (whether national, regional, or local, in scope). Some went further, and noted the inherent problems in conducting systematic, reliable needs assessments at the local level, particularly in localities characterized by either a small number or a diversity of industries employing neither a great number nor homogeneity of scientists and engineers. A two-part Chemical and Egnineering News article giving a national overview of continuing

education for scientists and engineers quoted several industry and college/university representatives to substantiate these difficulties. The following quotation seemed best to crystallize the problem:

> "A major shortcoming in the continuing education field today is the lack of good market analysis. Unfortunately, many schools just don't know what specific courses a potential number of their students really want" (Dr. L.Z. Pollari, Dean of Graduate and Professional Studies, Stevens Institute).[1]

The article just quoted also documented the need for improving the capacity of colleges and universities to design effective follow-through responses to the needs of industrial scientists and engineers. This need is found especially at the local level, where the following problems are symptomatic of the need for more responsive course and program planning:

- -Many colleges and universities do not offer the types of continuing education courses that technical people and their employers feel they need.
- -Although many schools do teach courses that would be useful to practicing scientists and engineers, these courses are often given only during the day, when it is difficult or impossible for industry people to attend.
- -Many scientists and engineers complain that the continuing education courses given by colleges and universities are not practical enough.
- -Although some industrial scientists are willing to make great personal sacrifices in order to take continuing education courses, many people will take few, if any, unless they are offered as conveniently and cheaply as possible.[2]

Looking beyond generalized statements of needs assessment/follow-through difficulties, the Consortium made several assumptions in deciding to focus its efforts on finding workable solutions to these problems at the local level. These assumptions were as follows:

a. Any continuing education resources-whether courses or programs originating from the local, regional, or national level, and whether supplied by college, universities, professional societies, or entrepreneurs-will be utilized only insofar as they meet individual companies' and employees' perceptions of their own needs.

b. Whatever resources are available at the regional and national levels, small and locally owned companies depend heavily on local resources-especially on local colleges and universities-to meet their continuing education needs.

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[1]Howard J. Sanders, "Special Report: Continuing Education: Part II--The Role of Universities and Scientific and Technical Societies", Chemical and Engineering News, 52, 19, 28.

[2]Ibid., "Part I: Continuing Education: the Intensified Efforts to Keep Up to Date", C & E , 52, 20, 20.

c. Within a community characterized by a diversity of industries that look to local colleges to meet many of their continuing education needs, accurate needs assessment is especially crucial. For instance, if a college designs a course specifically for industry but too few students enroll, the college will not simply drop the course but will probably be unwilling to consider offering similar courses in the future.

d. Accurate "needs assessment", in turn, <u>especially at the local level</u>, entails more than simply compiling a data base of courses and programs needed. Rather, needs assessments will lead to responsive, effective follow-up course and program planning only if the planners and providers are knowledgeable about the users' (employers' and employees') over-all continuing education goals and motivations, company incentives and relevant employee education policies, publicity policies and resources, employer and employee perceptions of delivery and other barriers and their preferred delivery systems. Further, the more knowledgeable continuing education planners and providers are about the user's <u>established patterns</u> of continuing education utilization, and about how effective various types of programs and delivery systems have proved in meeting the users' needs, the more able they will be to design and implement programs that will effectively meet existing needs.

e. <u>Especially at the local level</u>, in communities characterized by the presence of small to medium-sized industries that do not individually employ a large number or homogeneity of scientists and engineers, needs assessment and planning activities will be most effective if they are done comprehensively, rather than piece-meal, one-plant-at-a-time. Comprehensive surveying and planning will enable local industrial communities to meet their individual industries' continuing education needs more effectively through such means as information-sharing, the pooling of needs, and the pooling of resources.[1] In addition to the participation of the individual industries, the comprehensive needs assessment and planning process should involve potential program providers. As is the case in the Charleston area, these providers would most likely include local colleges and universities, non-local colleges and universities with a local "outreach", and relevant professional societies.[2]

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[1]Industry communication coordination and cooperation is important, of course, not simply to enable the provision of programs by local providers but also to enable local industries to afford non-locally sponsored offerings. For instance, a typical two-day ACS Short Course costs $125 per participant, but only $49 each for 50 participants and merely $32 each for 100 registrants.

[2]The outcome of this comprehensive assessment and planning should be not simply to design and implement locally sponsored courses and programs, but also to plan for the utilization of the widest range of appropriate options--e.g., the utilization of ACS courses, as mentioned above.

In its "Proposal Solicitation" for the CESE/SEDR program, NSF explained that the overriding purpose of all of the studies supported under this program would be to create "a clear picture of what CE for engineers and scientists is, how it functions, how it relates to other aspects of industrial organization, what its problems are, and how a coordinated attack on these problems can be mounted" (p.1). In its proposal, the Consortium proposed that these data be gathered at the local level as well as at the national level and that a "co-ordinated" problem-solving approach would be particularly important in communities where individual industrial plants are unable to provide or support the extent and diversity of continuing education programs needed by their scientists and engineers. Following from these arguments, the Consortium stated that the purpose of its proposed project would be to design, test, and disseminate a model system of needs assessment and planning mechanisms for the use of industries and colleges at the local and regional levels. As such, the project was intended to meet the following specific CESE/SEDR objective: the development of methods "to assist industrial organizations (or the continuing education divisions of colleges or universities) in assessing the educational needs of their employees (or their clientele) and in designing appropriate responses" ("Proposal Solicitation", p.2.).

2. Local Need: The Tricounty Community

In its proposal, the Consortium argued that the Charleston tricounty region represented an ideal "case study" for the testing of a model local needs assessment/planning system. The 2600 square mile tricounty area consists of Berkeley, Charleston, and Dorchester counties and comprises one of the three Standard Metropolitan Statistical Areas (SMSA's) in the state of South Carolina. The total population of the area is approximately 389,000; as of March, 1978, its employed civilian labor force totaled 136,700 people (an increase of 4,400 over March 1977), including 18,200 employed in 195 plants in the manufacturing sector.[1] The following characteristics made the tricounty area particularly suitable as a "case study" for the NSF project:

a. A diversity of small-to-medium-sized industries employing scientists, (predomimantly chemists), engineers (all categories), and engineering technicians. Out of a total of 185 plants, approximately 25, including two military installations (Charleston Air Force Base and Charleston Naval Base), employ engineers, chemists, and engineering technicians. The largest plant employs 1,600 people. In addition to the other factors that will be mentioned immediately below, continuing education needs assessment and program planning and implementation for these industries' chemists and engineers had not been extensively or effectively undertaken prior to the NSF project because: 1.) Most of the industries are small and their engineers, and especially their chemists, tend to represent a small proportion of their total number of employees. 2.) The industries, and therefore their scientific/technical employees, are extremely diverse, so that "sampling" techniques are difficult to design, and had been rarely applied.

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[1]Data Sources: "Charleston-North Charleston Metro Area Manpower News", March 1978, and Trident Area Manufactures Directory, both published by the Charleston Development Board.

3.) The industries are scattered throughout the three counties, rather than concentrated in industrial parks. 4.) In a "vicious circle", the industries' relative lack of contact with the area's four-year colleges, together with the lack of existing college courses and programs responsive to industry needs, discouraged intensive needs assessment by the industries themselves. 5.) Until quite recently (see b, immediately below), the industrial, and especially the manufacturing, sector has not been generally recognized as playing a major role in the economy of the area, which has been (and remains) most heavily dependent on government employment.[1]

The relative neglect of the needs of industrial scientists and engineers had begun to be rectified by 1978, when the Consortium devised its NSF project. Communication between local industry and the local colleges had improved markedly in extent and in purposefulness, particularly since the mid 1970's. Relative to the NSF project, perhaps the most important problem identified by the Consortium through its industrial contacts was that none of the area's industries employed a sufficient number or homogeneity of scientists and engineers to be able to provide or to support by itself the extent and diversity of technical/scientific continuing education programs needed.[2]

b. Rapid industrial development. In its NSF project proposal, the Consortium offered the following profile of the pattern of industrial development in the tricounty region over the preceding ten years:

"Between 1967 and 1977, 44 manufacturing plants, which currently employ nearly 7,100 persons, either have been established or newly located in the tricounty area: these plants represent 24% of the area's 185 manufacturing plants and their employees total 39% of the 18,200 persons employed in the manufacturing sector.

The pace of industrial growth has increased throughout the decade: whereas during the first six years (1967-73), 23 plants employing a total of 1,859 persons (median number of employees: 48) located in the area, the last four years saw the location of 22 plants employing a total of 5,247 persons (median number of employees: 175). During the first six months of 1978 alone, four plants that will employ more than 1200 persons (median number of employees: 176), have either located in the area or announced definite plans to locate in the area.

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[1]The Baptist College Business and Economic Report (November, 1977) pointed out that in 1975 the tricounty area received 44% of its income from federal, state, and local government employment, and only 12% from manufacturing.

[2]As nationally representative "types", tricounty industries and their scientist/engineer employees typify the smaller industries and "lonely scientist" whom the American Chemical Society has classified as among its own primary target audiences: "These are chemists {and by extension other scientists}who may be working in a major metropolitan area where there is a good concentration of chemists and of academic institutions. Nevertheless, because these people happen to work for small employers who do not have the resources to offer the kind of continuing education that larger employers can provide, they find themselves at nearly the same disadvantage as the chemist in a remote area." ("The Continuing Education Programs of the American Chemical Society", 1978 ACS public information brochure, p.8.). While the tricounty area cannot properly be labeled "a major metropolitan area" (nor do its academic institutions have the graduate programs and resources typically found in major metropolitan colleges and universities), the ACS profile of the lonely scientist is quite apropos.

As evidenced by the above statistics, the plants that have located in the area since 1974 have tended to be larger than those established between 1967 and 1973. Of greater relevance to the argument that the tricounty area represents an ideal "case study" for NSF interests, however, is the fact that the industries locating in the area since 1974 have included a higher proportion of highly technological industries than those plants that located in the area between 1967 and 1973: whereas 9 of the plants locating in the area between 1967 and 1973 employ chemists and/or engineers, 14 of the plants locating in the area between 1974 and 1977 employ chemists and/or engineers, including 4 plants (Dupont, Georgia Pacific, Amoco Chemicals, and Haarmann & Reimer Corp.) that manufacture chemical products."

As of 1978 the rapid pace of industrial growth in the tri-county area had had two related effects that pointed to the area's particular suitability as an NSF "case study": 1.) The problems in identifying and meeting the industrial community's scientific/technical continuing education needs had been exacerbated. The increasing influx of industries into the area meant that needs assessment and follow-through responses had to become systematized, and on-going. 2.) Particularly because an increasing proportion of the new industries were highly technological, the need for designing and implementing a system of continuing education needs assessment and planning for industrial chemists and engineers had become all the more pressing.

c. Unexploited potential for communication and cooperation among industries. As of 1978, the influx of industries into the tri-county area had been partly responsible for, and had certainly exacerbated, the industrial community's lack of formal communication and cooperation in identifying and meeting the continuing education needs of its scientists and engineers. Equally important factors were the diversity of the industries in the area and their scattered location throughout the three counties: both of these charactistics typify the situation of many communities and regions where the ACS-labeled "lonely scientists" are to be found.

d. Unexploited educational resources. Like many communities, the tricounty area has a diversity of higher education institutions. As of 1978, these institutions' resources had yet to be fully exploited to meet the needs of industry. Through the mid 1970's, education/industry contacts had been largely conducted on a one-institution to one-industry basis, allowing for neither the pooling of industry needs nor the pooling of the community's education resources to meet these needs. Program planning and course implementation were done largely on a short-term, semester-by-semester basis. With the staffing and funding of the Consortium in 1977, however, the five area institutions found a means for pooling their resources and offering cooperative services, programs, and a formal mechanism for industry/education liaison. In its NSF application, the Consortium stated that this network of communication and cooperation would itself be an important component of the continuing education needs assessment and planning system it proposed to devise.

C. PROJECT ACTIVITIES

Following is a summary description of each of the project's principle activities:

1. Spring-Fall, 1978: cultivation of community support and establishment of a project advisory committee. The Consortium involved representatives from local industries, relevant porfessional and community groups, and its own member institutions from the beginning of its project planning. Community support for and participation in the project was evident even as early as the submission of the NSF proposal, which contained letters of endorsement from the State Development Board, the Charleston Development Board, the State Board of Engineering Examiners, the Trident Work Education Council (which had awarded the Consortium a $1,100 mini-grant in support of the project), and the chief local executive officers of three highly regarded tricounty industries. Similarly, an initial advisory committee was formed to oversee the development of the project proposal and, when the grant was awarded (Fall, 1978), was slightly expanded and asked to serve as a continuing oversight committee. This committee has met periodically over the course of the project and currently consists of 22 members, including liaison representatives from the chemistry and engineering faculties of the CHEC institutions, representatives from the local ACS chapter, the State Board of Engineering Examiners, and the local Development Board, and representatives from key local industries. This committee has proved to be extremely valuable even beyond the ongoing advice and guidance it has offered during the project--i.e., as a means of conferring credibility and visibility on the project, as a "formal" mechanism for communication among all its members and the organizations they represent, and as a means for generating ideas and advice for undertakings beyond this particular project; for all of these reasons, the Consortium intends to keep this committee, or some variation of it, in existence as a continuing, ad hoc advisory-and-planning group.

2. Late Spring-Fall, 1979: conduct of Initial Management Survey[1]. This survey and the follow-up Employee Survey were the project's primary data gathering instruments. The Management Survey was a comprehensive questionnaire designed for the following purposes:

a.) To compile a comprehensive profile of the chemists, engineers, and engineering technicians employed by tricounty industries, and the sizes, types, (i.e., locally owned and operated, parent company, subsidiary or U.S. government installation) and location of the plants where they are employed.

b.) To identify how well continuing eudcation needs are being met, and how effective are/have been different kinds of programs (company-sponsored, sponsored by local colleges, non-local colleges, etc.)

c.) To identify management goals/motivations for supporting and encouraging continuing education programs.

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[1]Data summaries of all of the project's surveys are found in Part II of this report.

d.) To identify company incentives/support for employees' participation in various types of continuing education (e.g., credit and non-credit).

e.) To identify management perceptions of the problems/barriers in meeting the plants' continuing education needs (e.g., rotating shifts, need for highly specialized courses, etc.)

f.) To identify the types of delivery systems preferred by management (e.g., scheduling, site and course format preferences.)

g.) To identify management procedures for ascertaining employees' continuing education needs and interests.

h.) To identify management procedures for publicizing continuing education opportunities to plant employees.

i.) To identify each plant's resources available for the support and conduct of cooperative inter-industry continuing education programs (e.g., classrooms, laboratories, willingness to have employees serve as instructors.)

j.) To compile a three-year projection of the types of technical/scientific continuing education programs needed.

Initially, the Consortium had identified 42 tricounty plants that seemed likely employers of chemists, engineers, and/or engineering technicians. The project director sent a copy of the survey to the chief executive officer of each of these establishments, together with a cover letter explaining the purposes of the project and the activities (surveys) it entailed, its support by NSF and the Trident Work Education Council plus the endorsements it had won from other local and state groups, and the CHEC colleges' agreements that the project would constitute the single means they would use for collecting needs assessment data and that, further, they would share the data with other legitimate educational providers. The letter asked that the survey be returned by a specified date and also asked the recipient to send back an enclosed return-mail postcard naming his company's "official" representative to the project (whether himself or a designee). Those recipients who did not return the postcard or, later, the survey were telephoned by a project staff member; once a company had agreed to participate in the project, as many calls were made as were necessary to secure the completion of the survey. In the end, 25 of the 42 companies participated. Of the remainder, twelve did not, in fact, employ chemists or engineers, two had ceased operations, and two simply declined to participate.

3. Spring, 1980: Follow-up Management Interviews. As originally conceived, the follow-up Management Interviews were to be conducted with approximately half of the participating plants, by random selection, partially in-order to elaborate on and clarify the findings of the Initial Survey but principally to collect initial data about the utilization and effectiveness of different types of continuing education programs and delivery systems. Because the final version of the Initial Management Survey asked the latter questions, the principal purpose of the follow-up interviews became, instead, to answer questions that arose from particilar companies' responses to the Management Survey.

Accordingly, interviews were conducted with five companies; the interviewer also took this opportunity to ask further, more open-ended questions about each company's continuing education needs and effectiveness to-date in meeting those needs, particularly through the programs of local and in-state colleges.

4. Late Spring-Fall, 1980: Follow-Up Employee Survey. The Employee Survey was completed by 296 employees from 10 plants; the administration of the survey was handled through each of these plants' project representatives. The principal function of the survey was to follow-up the management surveys by asking the employees many of the same questions that were asked management, and for the same purposes--i.e., to compile needs data and comprehensive "profiles" of continuing education barriers, motivations and incentives, preferred formats and delivery systems, prior patterns of utilization and effectiveness, etc. In addition, more information was sought from this survey than could have been collected from management about both the individual employees' profiles and their continuing education "transcripts" during the previous three years.

5. Spring, 1981: Recommendations Report. The Recommendations Report was based on the advisory committee's analyses and discussions of the data gathered from the project's surveys and interviews. As a means of making this Report more accessible and attractive--and, thus, of ensuring maximum responsiveness to it--the committee determined that its focus should be to communicate only key recommendations, with "background" material limited to that information necessary to remind the readers how these recommendations had been derived. As a result, the Report listed seven recommendations, ranging from specific program recommendations to recommendations dealing with the structure and procedures for continuing Consortium/industry collaboration. The Report was distributed to all 25 of the participating plants' project representatives, the advisory committee members, and other individuals who had requested to be put on the project's mailing list.

6. Spring, 1981: Outcomes Survey. Each local person who was sent a copy of the Recommendations Report was also sent an "outcomes" questionnaire, an open-ended survey inviting not only the responders' reactions to the project recommendations but also their comments about the project as a whole and their own added suggestions for "improved practices" in needs assessments and responses (whether theoretical advice or ideas based on their own or others' experience) etc. Since only seven persons responded to this questionnaire, this was clearly the most disappointing project component. (Several individuals who chose not to respond have since commented that they did not fill out the survey because they thought it extraneous paperwork and/or they saw no need to respond since they were satisfied with the Recommendations Report and had no additional comments or suggestions to offer.)

7. Dissemination. By June 30, copies of this Summary Report will have been distributed to all of the plants participating in the project, the advisory committee members, the directors of the other five related NSF survey projects, and those "outside" individuals who have already requested that their names be put on the project's mailing list. In addition, a copy will be sent to the Chairman of the ASEE Continuing Professional Development Division's Publications Committee for that organization's review and possible consideration for dissemination. If the ASEE does not choose to disseminate the Report, notices of distribution will be placed in appropriate publications--e.g., Chemical and Engineering News and The Chronicle of Higher Education.

PART II: PROJECT DOCUMENTS

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CHARLESTON HIGHER EDUCATION CONSORTIUM

INITIAL MANAGEMENT SURVEY

The purpose of this survey is to determine the continuing education needs of chemists, engineers, and laboratory and engineering technicians employed by industries in Berkeley, Charleston, and Dorchester Counties. For the purposes of this survey, continuing education data are sought about employees who spend more than half of their time in the following job functions:

- research
- development
- testing and evaluation
- design
- construction
- inspection
- production
- installation
- operation
- maintenance
- planning
- contract and grant application
- data collection
- providing or researching of scientific or technical information
- enforcement of standards or regulations

Specifically excluded from this survey are data about employees who spend more than half of their time in management, sales, advertising personnel work, teaching and training, or providing medical, psychological, or socal services.

NAME OF FIRM:

CHIEF EXECUTIVE OFFICER (local):

NAME OF PERSON COMPLETING THIS FORM:

POSITION:

TELEPHONE:

SUMMARY OF INITIAL MANAGEMENT SURVEY

1. Type of company:

a. Locally owned and operated	4
b. Parent company of regional or national firm	2
c. Subsidiary of regional or national firm	12
d. Subsidiary of foreign firm	1
e. U.S. government installation	4
f. State of South Carolina (utility)	1
g. No response	1

TOTAL: 25

2. Total number of employees:

a. Less than 100	2
b. 100-199	5
c. 200-299	4
d. 300-399	1
e. 400-499	2
f. 500-999	5
g. Over 1000	4
h. No response	2

TOTAL: 25

3. Total number of chemists employed at this site, categorized by highest degree earned and specialization:

	Organic	Inorganic	Analytical	Physical	Other/Specify
a. Doctorates	74	19	0	0	3
b. M.S.	1	5	2	0	4
c. B.A./B.S.	6	16	12	0	7

4. Total number of chemical or laboratory technicians employed categorized by educational level.

a. Associate Degree	57
b. Less than Associate Degree	31

5. Total number of engineers employed, categorized according to highest degree earned and specialization.

	Chemical	Civil	Electrical	Electronics
a. Doctorate	9	0	0	0
b. M.S.	8	0	2	4
c. B.S.	69	140	175	60

	Industrial	Mechanical	Metallurgical	Other/Specify
a. Doctorate	16	0	0	1
b. M.S.	3	14	1	7
c. B.S.	23	187	10	38

6. Total number of engineering technicians, categorized according to educational level and specialization.

	Chemical	Civil	Electrical	Electronics
a. B.S.(e.g., in Engineering Technology)	6	2	8	3
b. Associate Degree	12	25	15	23
c. Less than Associate Degree	56	9	33	75

	Industrial	Mechanical	Metallurgical	Other/Specify
a. B.S.(e.g., in Engineering Technology)	0	6	4	3
b. Associate Degree	7	44	3	1
c. Less than Associate Degree	5	99	4	17

7. How important is scientific and technical continuing education to this company?

Above average	20
Below average	2
No response	3

8. How well are company's continuing education needs currently being met?

Above average	19
Below average	2
No response	4

9. Approximately what proportion of scientific/technical continuing education needs over the past three years have been met by in-house, company sponsored programs?

Majority	11
Less than majority	10
No response	4

10. How effective have the following types of non-company sponsored programs been in helping to meet the needs over the past three years?

a. Courses/programs offered by local colleges

Above average	11
Below average	10
No response	4

b. Courses/programs offered by non-local, in-state universities(i.e., USC and Clemson)

Above average	9
Below average	12
No response	4

c. Courses/programs offered by out-of-state colleges and universities

Above average	6
Below average	15
No response	4

d. Courses/programs offered by professional associations(for example: American Chemical Society courses)

Above average	6
Below average	14
No response	5

e. Other types of programs.

No response

11. How effective have the following course and activity formats been in helping to meet this company's scientific/technical continuing education needs over the past three years?

a. College credit courses

Above average	11
Below average	10
No response	4

b. College non-credit courses

Above average	7
Below average	13
No response	5

c. Seminars

Above average	12
Below average	8
No response	5

d. Conferences

Above average	12
Below average	9
No response	4

e. Workshops

Above average	13
Below average	7
No response	5

f. Correspondence courses

Above average	8
Below average	13
No response	4

g. Self-study

Above average	7
Below average	13
No response	5

h. Other effective formats

No response

12. How important do you feel are each of the following motives to this company's employees who participate in continuing education activities?

a. To improve performance of current job

Above average	19
Below average	2
No response	3

b. To prepare for promotion, salary increase or increased job responsibility

Above average	20
Below average	1
No response	4

c. Personal development

Above average	22
Below average	0
No response	3

d. Other important motives

No response

13. In general, how accessible are continuing education opportunities to scientific and technical employees?

Accessible	15
Less than accessible	6
No response	4

14. How serious are the following accessibility and delivery system problems to the utilization of continuing education programs by employees?

a. Rotating shifts

Marginal problem	16
Problem	7
No response	2

b. Employee travel

Marginal problem	22
Problem	1
No response	2

c. Few employees needing same courses/programs

Marginal problem	20
Problem	2
No response	3

d. Need for highly specialized courses

Marginal problem	18
Problem	5
No response	2

e. Lack of information about courses and resources of local educational institutions

Marginal problem	21
Problem	2
No response	2

f. Lack of information about non-local courses and programs

Marginal problem	20
Problem	2
No response	3

g. Lack of sufficient employee motivation

Marginal problem	20
Problem	3
No response	2

H. Other

No response

15. How acceptable are the following time-slots for employee participation in continuing education programs?

	Acceptable	Not Acceptable	No Response
a. Between 9am and noon, on-site,	9	11	5
b. Between 9am and noon, off-site,	12	8	5
c. Between noon and 4pm, on-site,	9	11	5
d. Between 4pm and 7pm, on-site,	11	8	6
e. Between4pm and 7pm, off-site,	14	6	5
f. Between 7pm and 10pm, on-site,	12	6	7
g. Between 7pm and 10pm, off-site,	19	4	2

16. How acceptable are the following delivery sites for continuing education programs?

	Acceptable	Not Acceptable	No Response
a. On-site	16	7	2
b. Located at neighboring plant	18	4	3
c. Located on campus of local college	24	0	1
d. Non-local site requiring employee commuting--e.g.: USC, Columbia	10	13	2
e. Non-local site requiring employee residency. Specify maximum time acceptable for residency period	5	18	2

17. How acceptable are the following course and program formats?

	Acceptable	Not Acceptable	No Response
a. Seminars and symposia	20	1	4
b. Short courses (full-length courses presented in concentrated format)	22	0	3
c. Video-taped instruction	23	0	2
d. Live video instruction with "talk-back" capacity	21	1	3
e. Live video instruction without "talk-back"	19	3	3
f. Guided self-study courses with audio tape reinforcement	18	5	2
g. Self-study correspondence courses (without media reinforcement)	15	7	3
h. Other	1 Response		

18. Which of the following resources are available at this company for the support of continuing education programs?

	No Response	Not Willing	Willing	No Facility	Facility
a. Classroom facilities	1			11	13
b. Laboratory facilities	1			17	7
c. Willingness to plan and participate in cooperative in-house programs with other local industries	1	6	18		
d. Willingness to have employees serve as course instructors	1	10	14		
e. Other	1	24	1		
f. None	4	20	1		

19. Which of the foilowing incentives does this company have for employee participation in continuing education programs?

	No response	Not allowed	Allowed
a. 100% tuition reimbursement	1	8	16
b. Between 75% and 99% tuition reimbursement	1	14	10
c. Between 50% and 74% tuition reimbursement	1	23	1
d. Between 25% and 49% tuition reimbursement	1	24	0
e. Permission to take courses during company time	1	18	6
f. Pay raises and/or promotions tied to earning higher degree	1	19	5
g. Pay raise and/or promotions tied to completion of certain courses or a specified number of course credits earned	1	23	1
h. Other	1	23	1
i. None	1	23	1

20. Which of the following types of courses does this company provide incentives for?

a. Only for courses awarding academic credit	0
b. Non-credit courses as well as credit courses	12
c. Only job-related courses	8
d. Courses for professional development not strictly job-related	4
e. None	0
No Response:	1

21. DO this company's incentive policies differ according to personnel classification (for example: according to the employee's organizational position, educational level, length of company service)?

a. Yes	3
b. No	18
c. No response	4

22. Which of the following methods does this company use to identify its continuing education needs?

	Does Identify	Does Not Identify	No Response
a. through management identification of employee training/education needed in order to perform certain jobs	19	5	1
b. through written surveys of departmental supervisors	3	21	1
c. through informal communication with supervisors or employees	13	11	1
d. Other.	5	19	1
e. None	1	23	1

23. Which of the following methods does this company use to publicize courses/programs among its employees?

	Does Utilize	Does not Utilize	No Response
a. bulletin board notices	18	6	1
b. company newsletter	11	13	1
c. through letter or other written communication to supervisors	16	8	1
d. through letters or other written communication to individual employees	6	18	1
e. other	3	21	1
f. none	2	20	3

24. Please circle the approximate number of employees who would be likely to enroll in the following programs over the next year:

	No Response	0	1-10	10+
B.S. Program in Chemistry	5	12	8	0
Master's Program in Chemistry	6	13	6	0
Specialized Graduate Courses in Chemistry	6	12	7	0
Doctoral Program in Chemistry	9	14	2	0
Associate Degree Program in Architectural Engineering Technology	8	13	3	1
Associate Degree Program in Chemical Engineering Technology	5	9	10	1
Associate Degree Program in Civil Engineering Technology	8	12	4	1
Associate Degree Program in Electrical Engineering Technology	6	2	16	1
Associate Degree Program in Electronics Engineering Technology	6	5	13	1
Associate Degree Program in Mechanical Engineering Technology	7	6	10	2
Associate Degree Program in Nuclear Engineering Technology	8	16	1	0
B.S. Program in Ceramics Engineering	8	16	1	0
Master's Program in Ceramics Engineering	8	17	0	0
Doctoral Program in Ceramics Engineering	8	17	0	0
B.S. Program in Chemical Engineering	7	11	7	0
Master's Program in Chemical Engineering	7	14	4	0
Doctoral Program in Chemical Engineering	9	15	1	0
B.S. Program in Civil Engineering	8	12	4	0
Master's Program in Civil Engineering	7	14	4	0
Doctoral Program in Civil Engineering	8	16	1	0
B.S. Program in Electrical/Electronics Engineering	7	8	10	0

24. Please circle the approximate number of employees who would be likely enroll in the following programs over the next year:

	No Response	0	1-10	10+
B.S. Program in Chemistry	5	12	8	0
Master's Program in Chemistry	6	13	6	0
Specialized Graduate Courses in Chemistry	6	12	7	0
Doctoral Program in Chemistry	9	14	2	0
Associate Degree Program in Architectural Engineering Technology	8	13	3	1
Associate Degree Program in Chemical Engineering Technology	5	9	10	1
Associate Degree Program in Civil Engineering Technology	8	12	4	1
Associate Degree Program in Electrical Engineering Technology	6	2	16	1
Associate Degree Program in Electronics Engineering Technology	6	5	13	1
Associate Degree Program in Mechanical Engineering Technology	7	6	10	2
Associate Degree Program in Nuclear Engineering Technology	8	16	1	0
B.S. Program in Ceramics Engineering	8	16	1	0
Master's Program in Ceramics Engineering	8	17	0	0
Doctoral Program in Ceramics Engineering	8	17	0	0
B.S. Program in Chemical Engineering	7	11	7	0
Master's Program in Chemical Engineering	7	14	4	0
Doctoral Program in Chemical Engineering	9	15	1	0
B.S. Program in Civil Engineering	8	12	4	0
Master's Program in Civil Engineering	7	14	4	0
Doctoral Program in Civil Engineering	8	16	1	0
B.S. Program in Electrical/Electronics Engineering	8	8	10	0

	No Response	0	1-10	10+
Master's Program in Electrical/Electronics Engineering	7	14	4	0
Doctoral Program in Electrical/Electronics Engineering	8	16	1	0
B.S. Program in Environmental Engineering	8	12	5	0
Master's Program in Environmental Engineering	8	14	3	0
Doctoral Program in Environmental Engineering	7	17	1	0
B.S. Program in Mechanical Engineering	7	11	7	0
Master's Program in Mechanical Engineering	5	15	5	0
Doctoral Program in Mechanical Engineering	6	17	2	0
B.S. Program in Metallurgical Engineering	7	17	1	0
Master's Program in Metallurgical Engineering	6	16	3	0
B.S. Program in Industrial Engineering	7	13	4	1
Master's Program in Industrial Engineering	6	16	3	0
Doctoral Program in Industrial Engineering	7	17	1	0
B.S. Program in Systems Engineering	7	16	2	0
Master's Program in Systems Engineering	6	16	2	0
Doctoral Program in Systems Engineering	7	17	1	0
B.S. Program in other Engineering speciality: Specify:	8	17	0	0
Master's Program in other Engineering speciality: Specify:	9	16	0	0
Doctoral Program in other Engineering speciality: Specify:	9	16	0	0
Management courses or program for technical/scientific personnel	4	3	15	3

CHARLESTON HIGHER EDUCATION CONSORTIUM

FOLLOW-UP MANAGEMENT INTERVIEW

1. NAME OF COMPANY: Representatives from five (5) companies interviewed

2. NAME AND POSITION OF PERSON INTERVIEWED: _____

_____

3. DATE OF INTERVIEW: _____

4. EXPANSION/CLARIFICATION OF DATA FROM INITIAL MANAGEMENT SURVEY:

5. WHAT IS YOUR ESTABLISHMENT'S ANNUAL EXPENDITURE FOR CONTINUING EDUCATION FOR SCIENTISTS AND ENGINEERS DURING CALENDAR OR FISCAL YEAR 1978. DO NOT INCLUDE SALARIES AND EXPENSES FOR YOUR IN-HOUSE CONTINUING EDUCATION OR TRAINING STAFF. DO NOT INCLUDE EXPENDITURES FOR CAPITAL EQUIPMENT.

(a) For tuition reimbursement programs. . . .$ 14,371 average (4 responders)

(b) For all other activities. . . . . .$ 48,667 average (3 responders)

(c) Total for all activities. . . . . .$ 50,871 average

6. LOOKING AHEAD OVER THE NEXT FIVE YEARS, WHAT ARE LIKELY TO BE THE AREAS OF MOST PRESSING NEED FOR SCIENTIFIC/TECHNICAL CONTINUING EDUCATION TO THIS COMPANY?

   Need for programs/courses for: engineers-4
   lab technicans -1

   Need for programs/courses in the areas of: computer sciences -1
   fiber optics -1
   integrated circuits -1

7. HOW RESPONSIVE HAVE THE LOCAL COLLEGES BEEN TO THIS COMPANY'S CONTINUING EDUCATION CONCERNS?--HOW EFFECTIVE HAVE THEIR PROGRAMS BEEN?--WHAT PROBLEMS HAVE THERE BEEN?

   All five respondents said that the colleges are responsive and that their programs are effective; Trident Technical College was specifically cited by four and The Citadel by two.

8. HOW RESPONSIVE AND EFFECTIVE HAVE OTHER IN-STATE COLLEGES BEEN? OTHER ORGANZATIONS?

   No problems noted; USC and Clemson cited by two.

9. WHAT SUGGESTIONS CAN YOU MAKE FOR IMPROVING COMMUNICATIONS WITH, AND THE RESPONSIVENESS OF, THE LOCAL COLLEGES?

   Need for more on-site training (1)
   Need to have single contact person/point in each industry (1)
   Need for more/better technical training at the secondary level (1)

CHARLESTON HIGHER EDUCATION CONSORTIUM

CONTINUING EDUCATION SURVEY: EMPLOYEE FORM

The purpose of this survey, which is funded by the National Science Foundation and the Trident Work-Education Council, is to determine the continuing education needs of chemists, engineers, and laboratory and engineering technicians employed by industries in Berkeley, Charleston, and Dorchester Counties. For the purposes of this survey, continuing education data are sought about employees who spend more than half of their time in the following job functions:

research	maintenance
development	planning
testing and evaluation	contract and grant administration
design	data collection
construction	
inspection	providing or researching of scientific
production	or technical information
installation	
operation	enforcement of standards or regulations

Specifically excluded from this survey are data about employees who spend more than half of their time in management, sales, advertising, personnel work, teaching and training, or providing medical, psychological, or social services. IF YOU SPEND MORE THAN HALF OF YOUR TIME IN THESE "EXCLUDED" WORK CATEGORIES, CHECK THIS BLANK._____
YOU NEED NOT FILL IN THE REST OF THE QUESTIONS, BUT SIMPLY RETURN THE QUESTIONNAIRE IN THE ENLCOSED ENVELOPE.

Employee Survey

Total Number of Responders: 296

1. YOUR NAME (optional):_____

(NOTE: ALL SURVEY RESPONSES WILL BE KEPT CONFIDENTIAL)

The 296 responders included 191 engineers, 43 supervisors (including 20 engineering supervisors

2. YOUR JOB TITLE: and 34 technicians.

10 Companies represented (The number of responders from each ranged from a high of 137 to a low

3. NAME OF YOUR COMPANY: of 7).

4. HOW OLD ARE YOU? Median age: 33 years

5. WHAT IS THE HIGHEST ENGINEERING OR SCIENTIFIC DEGREE YOU HOLD?

(a)	High school diploma or equivalent	13
(b)	Associate or technical degree	22
(c)	Bachelor's degree	228
(d)	Master's degree	26
(e)	Ph.D./Ed.D./M.D.	1
(f)	Other (specify:_____)	4

No response: 2

6. AT WHAT AGE DID YOU ATTAIN YOUR HIGHEST ENGINEERING OR SCIENTIFIC DEGREE? Median age: 23 (based on 292 responses)

7. DO YOU HOLD PROFESSIONAL REGISTRATION?

(a)	Yes, in engineering	87
(b)	Yes, in other field (specify:_____)	9
(c)	No	196

No response: 6

8. HOW MANY YEARS HAVE YOU BEEN EMPLOYED WITH YOUR PRESENT ORGANIZATION? ~~Median: 5~~ years (based on 292 responses)

9. HOW MANY YEARS HAVE YOU BEEN EMPLOYED AS A SCIENTIST OR ENGINEER? Median : 8 years (based on 285 responses)

10. WHICH ONE CATEGORY BEST DESCRIBES YOUR HIGHEST CURRENT LEVEL OF SUPERVISORY RESPONSIBILITY?

(a)	No supervisory responsibility	164
(b)	Supervision of technical and/or nontechnical personnel	64
(c)	Supervision of engineering and/or scientific personnel	45
(d)	Management of supervisory personnel	3
(e)	Management of a major department, division or program	16
(f)	General management of an organization	2

No response: 2

11. WHICH ONE CATEGORY BEST DESCRIBES YOUR HIGHEST CURRENT LEVEL OF TECHNICAL RESPONSIBILITY?

(a) Perform limited assignments with specific direction under an experienced engineer or scientist 6
(b) Perform assignments with limited directions, with a general review of work done 65
(c) Independently perform most work with directions only to general results expected 128
(d) Independently work in extending known techniques, data, etc. 29
(e) Technical direction and review of work performed by others 64

No response: 4

12. WHICH ONE CATEGORY BEST DESCRIBES YOUR SATISFACTION WITH YOUR PRESENT JOB SITUATION?

(a) Highly satisfied 63
(b) Satisfied 145
(c) Neutral 62
(d) Dissatisfied 20
(e) Highly dissatisfied 5

No response: 1

13. HOW MANY ENGINEERING OR SCIENTIFIC JOURNALS OR PERIODICALS IN YOUR FIELD DO YOU REGULARLY READ?

(a) Don't regularly read any 97
(b) Read one regularly 67
(c) Read two regularly 58
(d) Read three or more regularly 74

14. ARE YOU A MEMBER OF A NATIONAL PROFESSIONAL ASSOCIATION?

(a) Yes (specify: 112)
(b) No 184

15. HAVE YOU ATTENDED A PROFESSIONAL ASSOCIATION MEETING IN THE LAST YEAR ON THE NATIONAL, REGIONAL OR LOCAL LEVEL (CIRCLE ALL THAT APPLY).

(a) Attended a national meeting 16
(b) Attended a regional meeting 22
(c) Attended a local meeting 101
(d) Have not attended a meeting 178

16. WITH HOW MANY COLLEAGUES IN OTHER ORGANIZATIONS DO YOU EXCHANGE SCIENTIFIC OR ENGINEERING INFORMATION ON A REGULAR BASIS?

(a) None 126
(b) One to three 87
(c) Four or more 79

No response: 4

17. WHAT PERCENT OF YOUR TECHNICAL WORK TIME DO YOU ESTIMATE IS SPENT IN:

Work in which you feel you need more education and training than you have.	*Median	15%
Work well suited to your education and training	*Median	50%
Work requiring less education and training than you have.	*Median	25%
Your answer to this question should add up to 100%	TOTAL	100%

*Based on 292 responses

18. HOW IMPORTANT IS SCIENTIFIC/TECHNICAL CONTINUING EDUCATION TO YOU?

(a)	Very important	119
(b)	Moderately important	118
(c)	Slightly important	51
(d)	Not at all important	7

No response: 1

19. HOW WELL ARE YOUR CONTINUING EDUCATION NEEDS CURRENTLY BEING MET?

(a)	Very well	18
(b)	Moderately well	81
(c)	Marginally	90
(d)	Poorly	100

No response: 7

20. HAVE YOU PARTICIPATED IN ANY CONTINUING EDUCATION ACTIVITIES OVER THE PAST THREE YEARS?

(a)	Yes	159
(b)	No (go directly to question 28)	133

no response: 4

ITEM 22 BELOW IS CONCERNED WITH CONTINUING EDUCATION ACTIVITIES THAT YOU PARTICIPATED IN WITHIN THE LAST 36 MONTHS. PLEASE NOTE THAT A NUMBER IS REQUIRED IN EACH BOX. IF NONE, PLACE A "0" IN EACH BOX.

	DEGREE RELATED COURSES (MINIMUM 30 HOURS)	NON-CREDIT COURSES (MINIMUM 30 HOURS)	EDUCATIONAL ACTIVITIES (i.e., WORKSHOPS, SEMINARS, CONFERENCES, etc.) (5 to 29 hours)	ORGANIZED SELF-STUDY ACTIVITIES: (PROGRAMMED TEXTS, CORRESPONDENCE COURSES, ETC.)	OTHER (SPECIFY): _____ _____ _____
21.** UNDER EACH HEADING, ENTER THE NUMBER OF COMPANY SUPPORTED (e.g., THROUGH TUITION REIMBURSEMENT OR RELEASED TIME) ACTIVITIES THAT YOU PARTICIPATED IN AND YEAR YOU PARTICIPATED--e.g., 2(1977)					
(a) PRESENTED ON SITE					
(b) PRESENTED LOCALLY AT ANOTHER LOCATION (SPECIFY PRESENTING ORGANIZATION)					
33. 1. Varied responses					
2. Varied responses					
3. Varied responses					
(c) PRESENTED OUT OF TOWN AT ANOTHER LOCATION (SPECIFY PRESENTING ORGANIZATION)					
1. Varied responses					
2. Varied responses					
3. Varied responses					

** For "pick-up" on this question, see responses under question 24.

22. DID YOU PARTICIPATE IN ANY CONTINUING EDUCATION ACTIVITIES DURING THE LAST 36 MONTHS THAT WERE NOT SUPPORTED BY YOUR COMPANY; THAT IS, ACTIVITIES FOR WHICH YOU DID NOT RECEIVE FINANCIAL SUPPORT OR RELEASED TIME?

(a) Yes 54
(b) No 113
No response: 129

23. IF YOUR ANSWER TO 23 WAS YES, WHAT TYPES OF ORGANIZATIONS SPONSORED THESE ACTIVITIES? CIRCLE ALL THAT APPLY.

(a) College of university (Specify which):_____

_____) 32

(b) Professional Society (Specify:_____

_____ 4

(c) Independent edicational organization or business providing educational services (Specify:_____

_____ 4

(d) Other (specify:_____

_____ 17

(e) Don't know. 4

24. HOW EFFECTIVELY HAVE THE FOLLOWING FORMS OF CONTINUING EDUCATION MET YOUR NEEDS. PLEASE RATE EACH OF THE FOLLOWING IN TERMS OF THEIR EFFECTIVENESS, USING THE FOLLOWING SCALE:

1. Extremely effective
2. Very effective
3. Moderately effective
4. Slightly effective
5. Not at all effective
6. Never been involved in this type of activity

		Rating
124 responses	(a) Degree-related credit courses-minimum 30 hours	1(7);2(22);3(21);4(6);5(5);
	(b) Non-credit courses-minimum 30 hours	6(63
116 responses	(i) Conducted at your establishment	1(2);2(18);3(18);4(9);5(4);6(65)
119 responses	(ii) Conducted away from your establishment	1(7);2(21);3(33);4(7);5(2);6(49
	(c) Educational activities (workshops, seminars, conferences, etc.)-5-29 hours	
124 responses	(i) Conducted at your establishment	1(4);2(30);3(24);4(17);5(5);6(44)
125 responses	(ii) Conducted away from your establishment	1(4);2(43);3(29);4(15);5(3);6(
	(d) Organized self-study activities (correspondence	
118 responses	courses, programmed instruction, etc.)	1(5);2(17);3(21);4(15);5(6);6(54)
52 responses	(e) Other (specify)_____	1(4);2(5);3(2);4(0);5(0);6(41)

25. APPROXIMATELY HOW MUCH MONEY DID YOU AND YOUR COMPANY SPEND IN THE LAST 12 MONTHS FOR YOUR CONTINUING EDUCATION AND TRAINING?

128 responses (a) Personal cost.....$ Excluding the 70 who reported $0, the average spent was $283 ~~and the median~~ spent was $150

135 responses (b) Comany cost.....$ Excluding the 47 who reported $0, the average spen was $797 and the median spent was $500

26. APPROXIMATELY HOW MANY HOURS, BOTH PERSONAL AND COMPANY TIME, DID YOU SPEND IN THE LAST 12 MONTHS FOR YOUR CONTINUING EDUCATION AND TRAINING?

141 responses (a) Personal time....._____hrs. Excluding the 45 who reported 0 hours, the median was 50 hours

150 responses (b) Company time....._____hrs. Excluding the 50 who reported 0 hours, the median was 40hours.

27. IF YOU HAVE PARTICIPATED IN CONTINUING EDUCATION ACTIVITIES WITHIN THE LAST 3 YEARS, WHAT WERE YOUR PRIMARY OBJECTIVIES FOR PARTICIPATING? RATE EACH OF THE FOLLOWING OBJECTIVES IN TERMS OF THEIR IMPORTANCE TO YOU, USING THE FOLLOWING SCALE.

1-of highest importance
2-very important
3-moderately important
4-slightly important
5-not at all important

146 responses (a) To maintain present position in the company 1(5);2(16);3(29);4(31);5(65)

148 responses (b) To attain an enhanced or authority position in my field 1(23);2(50);3(35);4(14);5(26)

149 responses (c) To perform present job assignments better 1(33);2(50);3(34);4(18);5(14)

151 responses (d) To prepare for increased responsibility 1(37);2(52);3(14);4(22);5(26)

148 responses (e) To remedy deficiencies in initial training 1(13);2(24);3(31);4(33);5(47)

148 responses (f) To prepare for new jobs in same field of specialization 1(15);2(37);3(39);4(33);5(34)

148 responses (g) To prepare for new job in some other field of specialization 1(14);2(22);3(25);4(27);5(60)

148 responses (h) To prepare for professional registration or to maintain registration 1(23);2(26);3(15);4(9);5(75)

146 responses (i) To attain a salary increase 1(14);2(20);3(26);4(18);5(68)

145 responses (j) To fulfill requirements for promotion 1(14);2(14);3(19);4(23);5(75)

146 responses (k) To meet expectations or ease pressure of management 1(4);2(12);3(16);4(31);5(83)

152 responses (l) For intellectual stimulation 1(32);2(40);3(53);4(19);5(8)

147 responses (m) To get to know others within field of work 1(8);2(12);3(34);4(30);5(63)

28. IF YOU HAVE NOT PARTICIPATED IN CONTINUING EDUCATION ACTIVITIES WITHIN THE LAST 3 YEARS, CIRCLE YOUR REASONS FOR NOT PARTICIPATING.

(a)	There is no "payoff" for participating; that is, participation is not related to pay raises, promotion, additional responsibility, etc.	18
(b)	No need, additional knowledge is not necessary for present position.	10
(c)	The company does not encourage continuing education.	9
(d)	My immediate supervisor or manager does not encourage continuing education.	3
(e)	The company's financial support is not sufficient.	10
(f)	Physical distance from sources of continuing education are prohibitive.	13
(g)	Needed courses/seminars/ workshops are not offered or are not offered when I can attand.	20
(h)	Other personal commitments are more important to me at this time.	13
(i)	Not applicable - just received degree.	4
(j)	Not applicable - about to retire.	1
(k)	Other (specify: _____).	3

29. HOW SERIOUS ARE THE FOLLOWING PROBLEMS IN YOUR UTILIZATION OF CONTINUING EDUCATION PROGRAMS?

(a) Rotating shifts

Not a problem	Somewhat of a problem	Serious problem	
217	47	19	No response: 13

(b) Out-of-town travel in job

Not a problem	Somewhat of a problem	Serious problem	
188	79	19	No response: 10

(c) Need for highly specialized courses

Not a problem	Somewhat of a problem	Serious problem	
103	104	47	No response: 12

(d) Lack of information about local courses and programs

Not a problem	Somewhat of a problem	Serious problem	
119	139	27	No response:11

(e) Lack of information about non-local courses and programs

Not a problem	Somewhat of a problem	Serious problem	
116	138	30	No response: 12

30. HOW ACCEPTABLE TO YOU ARE THE FOLLOWING TIME-SLOTS FOR PARTICIPATION IN CONTINUING EDUCATION PROGRAMS?

(a)	Between 9am and noon, on-site, No response:24	Desirable 89	Acceptable 86	Not Acceptable 97
(b)	Between 9am and noon, off-site, No response: 27	Desirable 41	Acceptable 96	Not Acceptable 132
(c)	Between noon and 4pm, on-site, No response:28	Desirable 73	Acceptable 105	Not Acceptable 90
(d)	Between 4pm and 7pm, on-site, No response: 23	Desirable 66	Acceptable 122	Not Acceptable 85
(e)	Between 4pm and 7pm, off-site, No response: 19	Desirable 46	Acceptable 127	Not Acceptable 104
(f)	Between 7pm and 10pm, on-site, No response: 14	Desirable 45	Acceptable 123	Not Acceptable 114
(g)	Between 7pm and 10pm, off-site, No response: 11	Desirable 48	Acceptable 143	Not Acceptable 94

31. HOW ACCEPTABLE TO YOU ARE THE FOLLOWING DELIVERY SITES FOR CONTINUING EDUCATION PROGRAMS?

(a)	On-site No response: 9	Desirable 159	Acceptable 110	Not Acceptable 18
(b)	Located at neighboring plant No response: 15	Desirable 62	Acceptable 194	Not Acceptable 25
(c)	Located on campus of local college No response: 5	Desirable 108	Acceptable 178	Not Acceptable 5
(d)	Non-local site requiring employee commuting--e.g.: U.S.C., Columbia No response: 12	Desirable 5	Acceptable 66	Not Acceptable 213
(e)	Non-local site requiring employee residency. Specify maximum time acceptable for residency period. varied No response: 21	Desirable 5	Acceptable 62	Not Acceptable 208

32. HOW ACCEPTABLE TO YOU ARE THE FOLLOWING COURSE AND PROGRAM FORMATS?

(a) Seminars and symposia

Desirable	Acceptable	Not Acceptable	
92	167	31	No response: 6

(b) Short courses (full-length courses presented in concentrated format)

Desirable	Acceptable	Not Acceptable	
139	142	10	No response: 5

(c) Video-taped instruction

Desirable	Acceptable	Not Acceptable	
42	180	63	No response: 11

(d) Live video instruction with "talk-back capacity

Desirable	Acceptable	Not Acceptable	
80	177	29	No response: 10

(e) Live video instruction without "talk-back"

Desirable	Acceptable	Not Acceptable	
19	171	93	No response: 13

(f) Guided self-study courses with audio tape reinforcement

Desirable	Acceptable	Not Acceptable	
29	173	83	No response: 11

(g) Self-study correspondence courses (without media reinforcement)

Desirable	Acceptable	Not Acceptable	
23	152	107	No response: 14

(h) Other. Specify:

14 responses; varied

33. PLEASE LIST ALL OF THE CONTINUING EDUCATION COURSES AND PROGRAMS IN WHICH YOU WOULD BE LIKELY TO ENROLL, WERE THEY AVAILABLE, OVER THE NEXT THREE YEARS--e.g., B.S. PROGRAM IN CHEMISTRY: COURSE IN MICRO-PROCESSOR APPLICATIONS AND TECHNOLOGY, ETC.

Varied Responses

THANK YOU FOR YOUR HELP. PLEASE RETURN THIS FORM TO THE CHARLESTON HIGHER EDUCATION CONSORTIUM IN THE ENCLOSED ENVELOPE.

CHARLESTON HIGHER EDUCATION CONSORTIUM (CHEC)

NSF CONTINUING EDUCATION NEEDS ASSESSMENT PROJECT

RECOMMENDATIONS REPORT

March 1, 1981

I. BACKGROUND

This Recommendations Report is based on the Consortium's conduct and analyses of three surveys of the continuing education needs of engineers, chemists, and laboratory and engineering technicians employed by industries in Berkeley, Charleston and Dorchester Counties: 1.) an "Initial Management Survey" which was completed by management representatives from 25 industries; 2.) a "Follow-Up Management Interview" which was conducted with representatives from 5 of the participating industries; and 3.) an "Employee Survey" which was completed by 296 employees of 10 of the participating companies.

The recommendations were formulated during two meetings of the project's Advisory Committee--the first, a meeting of the full Committee, was held on November 7, 1980, and the second, a follow-up meeting of the Consortium institutions' representatives, was held on January 9, 1981.

II. RECOMMENDATIONS

1. That the colleges and industries should continue their joint needs assessment and planning mechanisms and activities (e.g., as exemplified by The College of Charleston's Advisory Committee for chemistry).

2. That the colleges need to make sure that their planning is responsive to both employer-perceived and employee- perceived needs. (The Management and Employee Surveys showed several potentially significant discrepancies between the two groups--e.g., whereas 19 out of the 25 managers said that their company's continuing education needs are being well met, 190 out of the 289 responding employees felt that their needs are being marginally or poorly met. The two groups may, of course, have different needs: the colleges need to meet the needs of <u>both</u>.).

3. That the colleges need to offer more courses and programs with the following characteristics: "special topics" focuses that are responsive to employer and/or employee demands; "compressed time" schedules; use of industrial employees as instructors.

4. That the colleges need to publicize better their current and planned program and course offerings.

5. That the College of Charleston, in cooperation with the Consortium, should continue its preliminary planning towards an M.S. in chemistry.

6. That The Citadel should continue its cooperation with Clemson University and the University of South Carolina in their offering of M.S. programs in engineering and should continue its planning towards offering specialized engineering courses (e.g., in microprocessors).

7. That in their efforts to enact the above recommendations, the colleges need to identify and work with more individuals (both managers and non-managers) from tricounty industries. Ideally, for instance, a given program planning group should have two or three representatives from each industry, and all major plants need to be represented; such broad and extensive industrial representation will help to ensure the generation of specific, viable program and course ideas and the better dissemination of course and program information within each plant and industry.

CHARLESTON HIGHER EDUCATION CONSORTIUM

NSF CONTINUING EDUCATION NEEDS ASSESSMENT PROJECT

OUTCOMES SURVEY

I. RESPONSES TO RECOMMENDATIONS REPORT

What are your reactions to the Recommendations Report? (You may wish to discuss here one or more of the following: your opinion of the feasibility and/or likely effectiveness of the recommendations; the recommendations' relationship to your organization's current--or planned--practices; additional suggestions for improved methods and procedures by which colleges can assess the continuing education needs of industrial employers and employees and can design appropriate responses to those needs; additional ideas, or current practices of your organization, in improving communication, cooperation, and coordination among tricounty industries and colleges; etc.).

Explicit endorsement of recommendations: 4
Need for continuing contacts and follow-up with industry representatives as recommendations are implemented: 2
Need to discuss needs in terms of "what jobs will be filled in the future": 1
Need for incentives for participation for industry representatives--e.g., reduction in course fees, lunch or dinner meetings: 1
Strongest need in undergraduate and graduate engineering: 1
Need for stronger recommendation for an M.S. in chemistry: 1
More "Special Topics" courses should be offered by The College of Charleston and M.U.S.C., and should be offered at night rather than in the afternoon: 1
Each college needs to include each major industry's training representatives on its mailing list: 1

II. PROJECT DISSEMINATION

Please list the name(s) and mailing address(es) of any other person(s) whom you feel would be interested in receiving a copy of the Summary Report of this project.

III. RESPONDER DATA*

*All responder data will be kept strictly confidential.

1. Your name and title:

2. Your organization: 7 responders

THANK YOU FOR COMPLETING THIS SURVEY. PLEASE RETURN THIS FORM IN THE ENCLOSED RETURN-MAIL ENVELOPE BY MARCH 15, 1981.

PART III: CONCLUSIONS; RECOMMENDATIONS FOR PROJECT ADAPTATION

This project has had two kinds of valuable outcomes. First, the surveys have yielded a wealth of data that the Consortium and its member institutions have found useful (and should continue to find useful) in the several ways they had anticipated in drawing up their list of survey objectives--i.e., ranging from the compilation of employer and employee "profile" data to the documentation of program and course needs. Second, beyond the data it has collected, the project has led the Consortium to institute means and procedures for improving ongoing communications and cooperation between its member institutions and the surrounding industrial and military communities. At the conclusion of this report, the Consortium staff would like to look at these two areas separately and pass on its recommendations accordingly.

A. DATA COLLECTION: THE SURVEYS

As just noted, the project surveys yielded data that are unquestionably valuable to the Consortium. Nonetheless, it must also be noted that the Consortium found that the conduct of these surveys was a time-consuming task as well as oftentimes a frustrating one--e.g., several plants required extensive follow-up work (phone calls and letters) before completing and returning the Management Survey. As its first recommendation, then, the Consortium advises any potential surveyors that they consider whether there are other means for meeting their particular objectives than formal "paper and pencil" surveys--e.g., through advisory committee discussions alone, through telephone polling, etc. In its own case, the Consortium staff feels that the surveys were a worthwhile investment of staff time for two reasons: 1.) because so little work had been done in "profiling" the area's rapidly developing industrial community and the engineers and scientists employed there; and 2.) because an actual documentation of needs is required for the justification of new programs by state-supported institutions in South Carolina and, particularly in light of this requirement, the Consortium wished to ascertain whether or not initial planning for graduate-level programs in engineering and chemistry should be encouraged to proceed. For all other purposes, however--e.g., for the needs identification of non-degree programs and courses--the Consortium could have done just as well, and with less work, to have relied completely on the information and suggestions received through the project's advisory committee.

To those organizations that do decide to conduct formal needs assessment surveys, the Consortium can offer several observations and recommendations based on its own experience. On the positive side, particularly in view of the amount of staff work required for a successful survey and the multiple purposes that the collected data will serve, the Consortium surveys certainly validated its initial assumptions that such needs assessment survey projects should be cooperatively sponsored and should be comprehensive in scope. Cooperative sponsorship will mean, ideally, that all of the local educational providers agree to support the project as a single means for gathering whatever data the survey is designed to collect. Such an agreement should make those industries asked to participate in the survey more willing to make that investment. Taken just one step further, this kind of agreement can lead the collective sponsors to agree to coordinate their follow-up responses to the survey as well; here, again, coordination and cooperation will not only make their participation in the survey seem a better investment to the participating plants but also makes good sense

as a follow-up strategy to the survey, particularly in areas like the Charleston SMSA where small plants and small colleges should obviously be seeking to expand every conceivable type of cooperation. A related recommendation is the Consortium's suggestion that surveyors cultivate as broad a base of support as possible for their surveys; in its own case, the Consortium's winning the endorsement of the State and local Development Boards, the Board of Engineering Examiners and other locally influential organizations was an important factor in some plants' decision to participate in the project. The Consortium's further recommendation that needs assessment surveys be comprehensive in scope refers both to who and what should be surveyed. The Consortium definitely found it advantageous to survey both managers and employees; although the two groups generally agreed in their needs assessments and preferences (which was valuable to know in itself), they also had some differences in opinion that would be important for program planners to be aware of--e.g., their preferred course formats. Similarly, the Consortium strongly recommends that other surveyors follow its practice of asking for considerably more information than simply courses and programs needed and wanted; the data collected about motivation, incentives, barriers, preferred formats, sites, and schedules and related "non-essential" matters constitute factors that the Consortium will seriously consider in its ongoing efforts to plan and conduct the particular programs and courses that local employers and employees have said that they need.

On the negative side, the Consortium staff and advisory committee feel that their project clearly involved too many surveys and that the Employee Survey, in particular, was too complicated in parts and too lengthy. The first observation is borne out by the fact that only seven individuals responded to the final questionnaire, the Outcomes Survey; as noted earlier in this report, several persons who chose not to respond have since commented that the survey seemed extraneous. The second conclusion is based on the comments of several company representatives, who felt that the Employee Survey was off-putting both because it was too long and because a few questions (particularly #22) were unnecessarily involved; apparently these problems were serious enough to have led some employees not to participate in the survey. Based on its own mistakes, then, the Consortium has two related recommendations for other surveyors to consider in designing their survey instruments. First, any survey should in fact be, and should be perceived by its participants to be, a purposeful attempt to collect significant data. The survey's potential participants should be informed from the first about the reasons for the survey and the uses to which the resulting data will be put; the latter information will be particularly attractive if the survey is intended to lead to a direct benefit for the responders. Second, the survey should neither be, nor appear to be, so lengthy or complicated as to require a considerable amount of time or reflection to complete. Similarly, each question should be clear, concise, and as easily answerable as possible given the objective of the question and the minimum information needed to meet that objective.

B. FOLLOW-THROUGH RESPONSES: INCREASING COORDINATION AND COOPERATION

As implied at the beginning of this section, the Consortium actually began laying the basis for its follow-through responses to its surveys by its early formation of the project's advisory committee. This group has been, and should continue to be, an essential mechanism for encouraging and actualizing improved coordination and cooperation between the tricounty region's colleges and its industrial community, and the Consortium strongly recommends that

interested groups (whether colleges or industries) in other communities also establish such a group as the cornerstone of their own needs assessment/follow-through project. The formation of such a group need not depend on the prior existence of a "parent" coordinating group (e.g., a consortium or industrial council), but should be able to be founded and maintained as an independent entity so long as individuals within the group agree to assume the responsibilities necessary to keep it functioning (e.g., scheduling meetings, committee communications, etc.). The Consortium recommmends further that such a group include a balance of representatives from all of those institutions and organizations that have a "stake" in improving the communications between education and industry in general and the provision of continuing professional education in particular; as noted earlier, these groups in the tricounty area included the five Consortium colleges, the major industries and military bases, and relevant community and professional organizations such as the local Development Board, Work-Education Council, and ACS chapter.

Following the Consortium's own experience, the industry/college coordinating group should prove particularly useful in communities like the tricounty area (regions containing "small, geographically dispersed industries" in NSF's words) because so many of the particular actions that might be taken to improve educational needs assessment or follow-through responses will either absolutely depend on or be significantly enhanced by increasing coordination and cooperation among the organizations represented in the group. In the Consortium's own case, all seven of the recommendations in its Recommendations Report either implicitly or explicitly called for increased cooperation, ranging from the use of industrial employees as instructors in "special topics" courses to the continuation of joint planning groups such as The College of Charleston's advisory committee in chemistry. And four of the eight recommendations made through the follow-up Outcomes Survey also asked for or assumed greater interaction and cooperation among the industries and other organizations that participated in the Consortium's project.

Beyond its fundamental recommendations towards the strengthening of cooperative mechanisms and practices, the Consortium advises that any group that conducts a needs assessment/follow-up project should also explicitly consider the need for improvement and follow-up responses in the following areas: the industries' increased utilization of locally and non-locally offered continuing education programs and courses that have proved effective; the increased utilization of particular program formats and delivery systems that have proved effective or have been identified as being particularly attractive; the improvement of company incentives and management practices designed to encourage employees' utilization of available continuing education resources; and the increased utilization of the industries' own resources--e.g., classrooms, labs, faculty--for courses offered by colleges or other non-industry providers. The identification of the need for specific actions to be taken in these areas should not absolutely require the conduct of a written survey or series of surveys such as the Consortium's project involved; rather, as was noted at the beginning of this section, a given project should definitely consider whether such needs might be adequately identified (if not documented) through far less time-consuming means such as informal polling or group discussions.